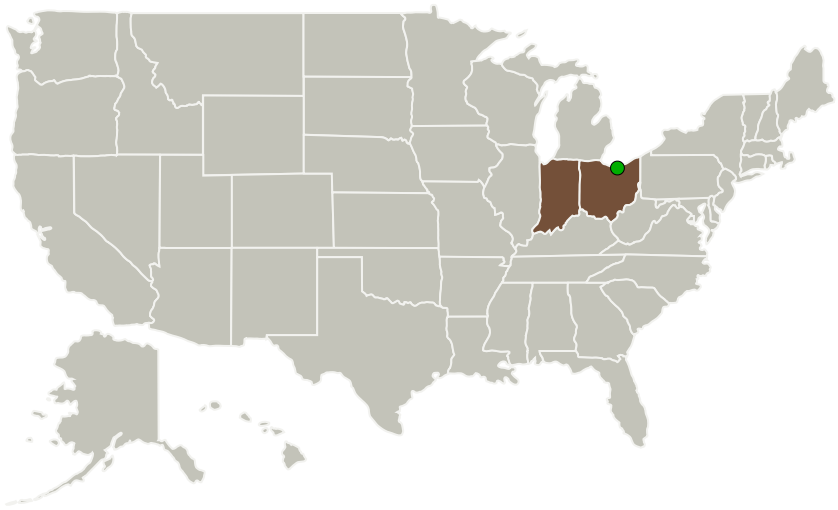
A Novel Flow Measurement System for Cryogenic Two-Phase Flow, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

Flow rate measurements for cryogenic propellants are required for spacecraft and space exploration systems. Such a requirement has been hampered by lack of fast and accurate instruments among existing technologies. This proposed project will develop a mass flow measurement system for non-conducting cryogenic propellant flow to meet the NASA's need. In the proposed system, an electromagnetic flowmeter for insulating fluids (EMFIF) will be able to provide real-time liquid velocity information under single- and two-phase flow conditions, and an X-ray void fraction sensor will provide phase concentration and interfacial velocity information. The X-ray sensor will also be able to detect bubble existence in cryogenic propellant flow. The whole proposed system will be a useful instrument to measure propellant flowrate in rocket engine feed lines. During the Phase I project, a test model of the proposal measurement technique will be designed and built. The performance of the proposed flowmeter will be studied in an experimental cross-calibration. If the Phase I study shows that it is feasible to employ the flowmeter for single/two-phase flow, the Phase II development towards engineering design and verification of the system will be carried out.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
En'Urga Inc	Lead Organization	Industry Small Disadvantaged Business (SDB)	West Lafayette, Indiana
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Indiana	Ohio

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137838)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

En'Urga Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

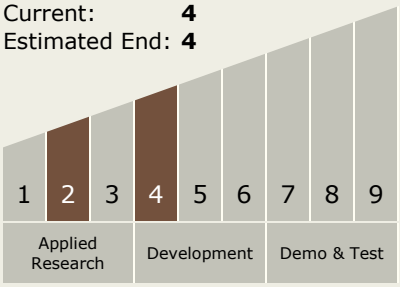
Carlos Torrez

Principal Investigator:

Ye Mi

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System